

- 9 -

CLAIMS:

1. A bone implant having a surface comprising a bioactive material, wherein:
 - (a) the bioactive material has incorporated therein ions from one or more of the groups of the periodic table consisting of groups IIA, IVA, VIIA and transition elements;
 - (b) the ions are incorporated into or onto the surface of the bone implant by ion beam implantation or cathodic arc deposition; and
 - (c) the bioactive material is a material that is capable of promoting bone growth onto the bone implant.
2. The bone implant as claimed in claim 1, wherein the bioactive material comprises hydroxyapatite.
3. The bone implant as claimed in claim 1 or claim 2, wherein the ions are incorporated into the surface atomic layers of the bone implant up to a maximum depth of 200nm.
4. The bone implant as claimed in claim 1 or claim 2, wherein the ions are incorporated into the surface of the bone implant up to a maximum depth of 150 nm.
5. The bone implant as claimed in claim 4, wherein the ions are incorporated into the surface at depths ranging up to approximately 100nm.
6. A bone implant as claimed in any one of the preceding claims wherein the ions are present at a level of between 1×10^{10} and 1×10^{18} ions per cm^2 of the surface.
7. A bone implant as claimed in any one of the preceding claims, wherein the ions are selected from one or more groups of the periodic table consisting of groups IIA, IVB, VIB, VIIB, VIII, IB, IIB, IVA and VIIA.

AMENDED SHEET

- 10 -

8. A bone implant as claimed in claim 7, wherein the ions comprise one or more of the following:

magnesium, calcium, strontium, titanium, chromium, manganese, iron, copper, zinc, silicon and fluorine ions.

9. A bone implant as claimed in claim 7, wherein the ions incorporated into the surface of the bone implant are from one or more of the groups of the periodic table consisting of groups IIA, VIIB, IIB, IVA and VIIA.

10. A bone implant as claimed in any one of the preceding claims, wherein the ions comprise magnesium, manganese, zinc or silicon ions.

11. A bone implant as claimed in any one of the preceding claims, comprising a body portion coated with a bioactive material coating.

12. A bone implant as claimed in claim 11, wherein the body portion is formed of a metal or a metal alloy, preferably a titanium alloy.

13. A bone implant as claimed in any one of claims 1 to 10, wherein the bone implant substantially comprises a bioactive material.

14. A bone implant as claimed in claim 13, wherein the bone implant is in granular form.

15. A method of treating a bone implant having a surface comprising a bioactive material to improve the bone ongrowth properties of the bone implant comprising subjecting the bone implant to ion beam embedding thereby to incorporate ions from one or more of the groups of the periodic table consisting of groups IIA, IVA, VIIA and transition elements into the surface.

AMENDED SHEET

- 11 -

16. The method as claimed in claim 15, wherein the bioactive material comprises hydroxyapatite.

17. The method as claimed in any one of claim 15 or claim 16, wherein the ions are incorporated into the surface up to a maximum depth of 200nm.

18. The method as claimed in claim 17, wherein the ions are incorporated into the surface up to a maximum depth of 150nm.

19. The method as claimed in claim 18, wherein the ions are incorporated at depths ranging up to approximately 100nm.

20. The method as claimed in any one of claims 14 to 19, wherein the ions are present at between 1×10^{10} and 1×10^{18} ions per cm^2 of the implant surface.

21. The method as claimed in any one of claims 14 to 20, wherein the ions are selected from one or more groups of the periodic table consisting of groups IIA, IVB, VIB, VIIB, VIII, IB, IIB, IVA and VIIA.

22. The method as claimed in claim 21, wherein the ions comprise one or more of the following:

magnesium, calcium, strontium, titanium, chromium, manganese, iron, copper, zinc, silicon and fluorine ions.

23. The method as claimed in claim 21, wherein the ions incorporated into the surface of the bone implant are from one or more of the groups of the periodic table consisting of groups IIA, VIIB, IIB, IVA and VIIA.

24. The method as claimed in claim 23, wherein the ions comprise magnesium, manganese, zinc or silicon ions.

AMENDED SHEET